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U.S.D.A. PLANT BREEDERS CREATE
NEW FRUITS, VEGETABLES, CEREALS

The stories back of the lima beans, grapes, and bread served at the research luncheon follow the same general line. The breeding of any new plant variety in any U. S. Department of Agriculture laboratory in any part of the country starts with crossing plants of two or more existing varieties. The resulting hybrids are grown in a greenhouse or an experimental plot. Seeds or seedlings of the new variety when finally established are turned over to commercial seedsmen or nurseries to be increased for eventual sale to farmers.

The plant breeder starts with a blueprint - in his mind or on paper - of the fruit, vegetable, or cereal or forage crop needed to meet some special need in American agriculture. He selects varieties, either domestic or brought in from abroad by Department plant explorers, that have one or more of the characteristics he wants for his new plant, such, for example, as outstanding yield, good storing and shipping qualities, and disease resistance. He crosses these varieties to get a hybrid that he hopes will combine all the desired qualities, with none of the bad ones, of its parents. Depending upon the nature of the hybrid and its parents, it may be back-crossed to one of the parents, outcrossed to some other variety, or sometimes merely selfed and selected through several generations until it breeds true to type. It is thoroughly tested before it is released to the trade.

The Peerless lima bean was bred to meet the need for a medium-size bean that would yield as well as the Henderson - a good standard variety - and would be better adapted to preservation by canning and freezing. It is a cross between two other standard varieties - the Fordhook and the Sieva. The new bean is smaller than the Fordhook but larger than the Henderson. The beans are fat, uniform, thick-skinned, and a rich green color when fresh. After extensive tests showed that it could outyield the Henderson, the Peerless lima bean was released to the trade in 1948. Small commercial plantings across the country this past year maintained the record of high yields made in experimental plots.

The grapes - large, sweet, and purple - are the result of crossing the Vergennes, a hardy eastern variety, with the Ribier, a very sweet table grape grown in California. The new variety was created to meet the demand for an Eastern table type with firm, crisp flesh. The plant breeders began work on it in 1935. The new grape, not yet even named, will not be ready for large-scale commercial planting for at least several years. It must be tested widely before the plant breeders can tell whether it is worth while.

The two loaves of bread - one at either end of the table - were left uncut to show the difference in baking qualities of two new varieties of wheat, one - Comanche - bred by the Department, and the other - Red Chief - by a private breeder. Red Chief, a beardless red-chaffed grain, gives a higher test weight than any other hard red wheat and yields well. It has other desirable qualities, but it mills so poorly that it is not acceptable as a bread wheat for most of the trade. During the war it was used for feed and for alcohol. Comanche, a bearded variety, matures early in the season, thus escaping damage by hot winds. It yields exceptionally well and has excellent milling and baking qualities. In 1948, the first year it was grown commercially in large volume, it improved the baking quality of flour from the Southwest. The following pictures show a few of the steps in breeding and testing new fruits, vegetables, and cereals. (OVER)

(EDITORS AND WRITERS: You may obtain 8x10 glossy prints of any of the pictures here shown free on request to Press Service, Office of Information, U. S. Department of Agriculture, Washington 25, D.C.)

The creation of a new fruit, vegetable, or cereal is a time-consuming task, calling for endless patience and great skill.

(1) One of the early steps in breeding a new variety is to transfer pollen from the blossom of one parent plant to the blossom of the other parent plant. To guard against self-fertilization, the anthers that hold the pollen are removed from the female parent plant flower before the pollen is mature and before that flower can receive pollen from any other flower. The emasculated flower then is protected against undesirable pollen. Some species can be pollinated at once. Here Dr. Roy Magruder makes crosses of promising lima bean selections in the greenhouse at Plant Industry Station, Beltsville, Md.

(2) Pollen from one parent plant is placed on the pistil of a blossom of the other parent plant.

(3) Seedlings are grown in pots outdoors before transfer back to the greenhouse.

(4) Dr. Roy Magruder examines a promising lima bean hybrid.

(5) Beans of the new Peerless variety are fat, uniform, thick-skinned, and of a rich, green color.

(6) New grape varieties are developed in the Department's experimental vineyards in different parts of the country. Here Nathaniel H. Loomis, associate pomologist, inspects a new hybrid variety.

(7) D. H. Scott, geneticist, compares two new hybrid grape varieties.

(8) New varieties of wheat are planted in experimental plots in wheat-growing sections of the country. Here Glenn M. Smith, agronomist, records the plant type, resistance to disease, and other characteristics of wheat in an experimental field in North Dakota.

(9) Samples of new wheat varieties that show promise in preliminary tests at the Department's field stations are sent to the milling and baking laboratory at the Agricultural Research Center, Beltsville, Md., for further testing. Here Grain Technologist T. F. Hartsing weighs out a sample of a new wheat, for milling and baking tests.

(10) He transfers the sample to the small-scale mill

(11) And weighs out a sample of the resulting flour for baking tests.

(12) Baking Technologist J. F. Hayes runs the dough made from the flour into a machine that feeds it out in loaves of equal size.

(13) Baking Technologist Ray Weaver compares two loaves of bread baked from two new varieties of wheat. The larger loaf is from Comanche; the smaller, from Red Chief.